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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

PAIK, SANG YEOP

ART UNIT	PAPER NUMBER
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3742

DATE MAILED: 07/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/693,820

Applicant(s)

SANDBERG ET AL.

Examiner

Sang Y. Paik

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2006.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 409-465 is/are pending in the application.
4a) Of the above claim(s) 415 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 409-414 and 416-465 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/24/06, 3/28/06
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 409-411, 418-435, 437, 439-442, 445-455, 458-465 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP130671 in view of Holen (US2002/0028070).

EP130671 discloses a fluid electric heater (P. 17 and Fig. 4) comprising ferromagnetic materials configured such that the heater automatically reduces its heat output near or above a selected temperature (Curie temperature of the ferromagnetic material). The heater autoregulates its temperature about the Curie temperature via its intrinsic resistance. See abstract and P. 13, lines 3-14. The heater is connected to an AC source with a frequency of 50 Hz -10 KHz. See P. 8, lines 19-23.

Regarding claims 418 and 458, EP130671 discloses a number of different iron-nickel alloys with varying Curie temperatures suitable as ferromagnetic materials for autoregulating electric heaters. See P. 14, Table I (noting that iron-nickel alloys have relatively lower Curie temperatures compared to other ferromagnetic materials).

Regarding claim 432, the limitation that the selected temperature is "within about 50 °C of the Curie temperature of the ferromagnetic material" fully reads on EP130671 since the selected temperature disclosed in EP130671 (i.e., the Curie temperature) falls within the claimed range.

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Regarding claim 419 and 442, see P. 9, lines 24-26.

Regarding claim 422, see P. 6, lines 24-28.

Regarding claim 446, because (1) the heater of EP130671 utilizes the skin effect of the conductor to ultimately dictate its heating, (2) the inverse relationship between frequency and skin depth is well known (see P. 2, lines 11-28), and (3) a wide frequency range of 50 Hz - 10 KHZ is envisioned (see P. 8, line 19-23), the heater of EP130671 would inherently control the skin depth in the conductor by varying the applied frequency.

The claims differ from EP130671 in calling for the AC voltage to be above about 200 volts. But powering ferromagnetic heaters with such voltages to heat petroleum-based fluids is well known in the art. Holen (US 2002/0028070), for example, discloses applying a voltage from 5-40 kV to heat a ferromagnetic tube to heat the fluid therein. See Paras. 0010, 0011, and 0015. Such a voltage ensures that the petroleum-based fluids are sufficiently heated to maintain an adequate viscosity. In view of Holen (US 2002/0028070), it would have been obvious to one of ordinary skill in the art at the time of the invention to power the ferromagnetic heater of EP130671 with 200 V or more to ensure that petroleum-based fluids are sufficiently heated to maintain an adequate viscosity.

Regarding claims 419, 420, 421, 422, 427, 439, 440, 442, 459, 460, and 463, no criticality is seen in the specific values of reduced heat above or near the selected temperature, turndown ratio, the ferromagnetic material's thickness and length, the conductor's resistance as a function of temperature, and heat output reduction in lieu of the autoregulating heater disclosed in the prior art. Moreover, the specific values claimed

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merely optimize result-effective variables well within the scope of routine experimentation by skilled artisans depending on the desired temperature and heat output. It is well settled that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233,235 (CCPA 1955).

Claims 412, 413, 416, 436, 438, 443, and 456 are rejected under 35 U.S.C. 103 (a) as being unpatentable over EP130671 in view of Holen (US 2002/0028070) and further in view of Pritchett (US 3,757,860). Pritchett (US 3,757,860).

The claims differ from EP130671 in calling for configuring the heater to heat a subsurface formation. But heating subsurface formations with ferromagnetic electric heaters that utilize skin effect heating is well known in the art. Pritchett (US 3,757,860), for example, discloses a well heater comprising an AC generator 15 connected to ferromagnetic (steel) casings or pipes 11 and 4 to heat the casings as well as the surrounding subsurface formation by the intrinsic skin effect as electric current flows through the pipes' ferromagnetic material. Thus, the viscosity of liquid produced in the well (i.e., hydrocarbons) is reduced. See abstract, col. 3, lines 19-40, col. 5, line 63 - col. 6, line 61, and the figure. With such a ferromagnetic skin effect heater, the formation can be heated directly by merely connecting AC to a long metallic structure that is buried within the formation, such as a ferromagnetic pipe or casing. In view of Pritchett (US 3,757,860), it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the autoregulating ferromagnetic electric heater to heat subsurface hydrocarbon-producing formations to reduce the hydrocarbons' viscosity thereby

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enhancing recovery. Such an arrangement enables heating the formation by merely connecting AC to a long metallic structure that is buried within the formation, such as a ferromagnetic pipe or casing.

Claims 414, 444, and 457 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP130671 in view of Holen (US 2002/0028070), Pritchett (US 3,757,860), and further in view of Vanegmond et al. (US 4,572,299).

The claims differ from the previously cited prior art in calling for heating the hydrocarbon material at or above a pyrolysis temperature. But heating subsurface hydrocarbon formations at or above pyrolysis temperatures is well known in the art as evidenced, for example, by Vanegmond et al. (US 4,572,299) in col. 1, line 39 - col. 2, line 7. As is well known in the art, heating formations at or above pyrolyzing temperatures to enable recovery of hydrocarbons from the formation. In view of Vanegmond et al. (US 4,572,299), it would have been obvious to one of ordinary skill in the art at the time of the invention to heat the formation at or above pyrolyzing temperatures to enable recovery of hydrocarbons from the formation.

Claim 417 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP130671 in view of Holen (US 2002/0028070) and further in view of CA2152521.

The claim differs from the previous cited prior art in calling for a three-phase power source. But powering a downhole ferromagnetic electric heater with a three-phase power source is well known in the art as evidenced, for example, by CA2152521 noting Figs. 11 and 12 and P. 32, line 11 - P. 35, line 21. As is well known in the art, three phase

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loads take advantage of the higher voltage and power level associated with three-phase power distribution. In view of CA2152521, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a three-phase power source in the previously described apparatus to take advantage of the higher voltage and power Level associated with three-phase power distribution.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi* 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985)., *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 616 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969). A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b). Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 409-414 and 416-465 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims

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466-469, 471-492, 494-507 and 509-518 of copending Application No. 10/693,700 in view of Holen (US 2002/0028070). The claims differ from the claims of the '700 application in calling for the AC voltage to be above about 200 volts. But powering ferromagnetic heaters with such voltages to heat petroleum-based fluids is well known in the art. Holen (US 2002/0028070), for example, discloses applying a voltage from 5-40 kV to heat a ferromagnetic tube to heat the fluid therein. See Paras. 0010, 0011, and 0015. Such a voltage ensures that the petroleum-based fluids are sufficiently heated to maintain an adequate viscosity. In view of Holen (US 2002/0028070), it would have been obvious to one of ordinary skill in the art at the time of the invention to power the ferromagnetic heater of the '700 application with 200V or more to ensure that petroleum-based fluids are sufficiently heated to maintain an adequate viscosity. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 409-414 and 416-465 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 268-408, 625, 659, 685, and 710 of copending Application No. 10/693,816 in view of Holen (US 2002/0028070). The claims differ from the claims of the '816 application in calling for the AC voltage to be above about 200 volts. But powering ferromagnetic heaters with such voltages to heat petroleum-based fluids is well known in the art. Holen (US 2002/0028070), for example, discloses applying a voltage from 5-40 kV to heat a ferromagnetic tube to heat the fluid therein. See Paras. 0010, 0011, and 0015. Such a voltage ensures that the petroleum-based fluids are sufficiently heated to maintain an adequate viscosity. In view of Holen (US 2002/0028070), it would have been obvious to

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one of ordinary skill in the art at the time of the invention to power the ferromagnetic heater of the '816 application with 200 V or more to ensure that petroleum-based fluids are sufficiently heated to maintain an adequate viscosity. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

Applicant's arguments filed 3/16/2006 have been fully considered but they are not persuasive.

With respect to the election of species, the applicant argues that since the applicant uses the transitional term "comprising" the elected species (1) is not limited to only a single ferromagnetic material, and thus election requirement with respect to Species (A) should be removed. It is noted that claims are not species but are definitions of the inventions, and since the species with only a single ferromagnetic material is a distinct species different from that of a composite material, the restriction requirement is proper. When the claims recite for species that is not elected, such claims would not be considered under merit as being non-elected by the original representation. Therefore, the applicant's argument is not deemed persuasive.

With respect to EP130671, the applicant argues that no prima facie of obviousness has been made since EP130671 does not show the claimed system or methods for heating at an AC voltage above 200 volts in which a reduced amount of heat is provided above or near a selected temperature. The applicant points out the heating operation of EP130671 below the Curie temperature. But EP shows the heating operations below the Curie temperature as well above the Curie temperature which is

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determinative of the resistance of the heating element. Furthermore, EP shows the operation of its heating system wherein the AC is supplied with 140 volts maintaining the temperature somewhat below the Curie temperature. This shows that the temperature is at or about the Curie temperature. To show the AC voltage to be above about 200 volts, the Holen reference is applied to show that it is well known that such AC voltage is not only known but would have been obvious to vary the AC voltage to provide varying heat to keep or maintain the adequate viscosity of a fluid including the petroleum-based fluids. According to the Ohm' law, the power is directly related to the voltage applied, it would have been obvious to one of ordinary skill in the art to provide the AC voltage with 200 volts or more to produce higher heating watts/power.

The applicant further argues that because Holen does not show using the ferromagnetic material to limit the current, it would not have been obvious to combine with EP130671. As the applicant's ferromagnetic is capable of limiting current as it reaches the selected temperature about the Curie temperature of the ferromagnetic material, so will the ferromagnetic material of Holen as well as that of EP130671. See MPEP 2112.01. Furthermore, Holen showing the AC voltage within that of the claimed voltage, there is no teaching that would be contrary to that of the claimed invention.

With respect to Pritchett, it is noted that the Pritchett reference is applied to teach the use of heater for heating subsurface formation, and since Pritchett is in the same field of endeavor which includes producing the skin effect as that of the EP130671 and Holen, it would have been obvious to one of ordinary skill in the art to further adapt EP130671 and Holen to use their heating system for heating subsurface formation.

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With respect to Vanegmond, the applicant argues since either EP130071 nor Holen shows the heating of a hydrocarbon formation and pyrolyzing at least some hydrocarbons in the formation, there is no reason to combine the applied art. This argument is not deemed persuasive since they are generally in the same field of endeavor providing electric heating, and particularly with the ferromagnetic material, which is known to be a self-regulating heating element. As such the heating system can be operated in a self-regulating manner in an environment, including heating of the hydrocarbon formation, wherein the self-regulating heating manner would enhance the overall heating operation of the system.

With respect to CA 2152521, it clearly shows the three-phase power source that is well known in the art. And applying such power source would have been obvious to further improve the power distribution of the heating system of EP 130671 as modified by Holen.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sang Y. Paik whose telephone number is 571-272-4783. The examiner can normally be reached on M-F (9:00-4:00) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robin Evans can be reached on 571-272-4777. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

S. Paik

Sang Y Paik
Primary Examiner
Art Unit 3742

syp